

Neue PCT-Anmeldung
Ulrich Braun
u. Z.: K 2041 PCT

Claims

1. Method for treatment and loop-processing of waste waters comprising the steps as follows:
 - (a) separate collection of the partial streams grey water, or one or more of the partial streams thereof and black water or brown water and yellow water, and
 - (b) desalination of a part or total parts of at least one of the separated collected partial streams of (a), and
 - (c) reuse of the desalinated liquid phase of (b) to
 - (c.i) collection of black water or brown water and/or yellow water in (a), or
 - (c.ii) other uses, and
 - (d) repetition of the steps (a) to (c) one or more times.
2. Method according to claim 1), whereas the desalination in step (b) comprises an ureolysis.
3. Method according to claims 1) and 2), whereas the desalination in step (b) comprises the following steps:
 - (b.a) ureolysis, and
 - (b.b) removal of the nutrient salts.
4. Method according to claims 1) and 3), whereas the desalination according to claim 1), step (b), as well as the removal of nutrient salts of claim 3), step (b) is a struvite precipitation.
5. Method according to claims 1) to 4), whereas after the desalination in step (b) the following step is proceeded:
 - (c) second desalination

6. Method according to claim 5), whereas the second desalination comprises the univalent inorganic salts.
7. Method according to claims 1) to 6), whereas before step (b) the following step is proceeded:
 - (a.i) liquid/solids separation of at least one of the separate collected partial streams obtained in (a)
8. Method according to claims 1) to 7), whereas after step (b) the following step is proceeded:
 - (b.i) oxidation of at least one of in (b) obtained low-salt phases from separate collected black water and/or brown water.
9. Method according to claim 8), whereas after step (b.i) the following step is proceeded:
 - (b.ii) liquid/solids separation of at least one of the products of (b.i) of separate collected black water and/or brown water
10. Method according to claim 9), whereas after step (b.ii) the following step is proceeded:
 - (b.iii) UV-Oxidation of the liquid phase of at least one of the products of (b.ii) from separate collected black water and/or brown water
11. Method according to claims (1) to (10), whereas step (b) is a ultra or nano filtration.
12. Method according to claims (3) to (11) whereas between step (b.a) and (b.b) a metered addition of substances in solid or liquid form.
13. Method according to claim (12), whereas the metered addition comprises the alkali KOH, and/or the substances Mg(CH₃COO)₂ and/or Mg(COO)₂ and/or potassium phosphate compounds with, and/or without hydrogen.

14. Method according to claim (13), whereas the metered addition is proceeded with stoichiometric amounts being adapted to the concentrations of ammonium within the liquid to be treated.
15. Method and device according to claim (12), whereas the metered addition of substances is proceeded according to that amount of ammonium, which is necessary, to render the equalisation of the pH decrease, caused by the transformation of ammonium to nitrate, in the oxidation of step (b.i) possible, which neutralises the basic milieu of the discharge of step (b).
16. Method according to claims (5) to (15), whereas the desalination in step (c) is a reverse osmosis.
17. Method according to claims (1) to (16), whereas steps (b) and (c) are executed in one holding tank, or in two hydraulically not separated holding tanks.
18. Method according to one of the claims (10) to (17), whereas step (b.iii) is a activated carbon adsorption and/or ozonisation and/or UV treatment.
19. Method according to claim (1), whereas the desalination is a complexation of bivalent ions with a complex-forming agent.
20. Method according to claim (19), whereas the complex-forming agent is amino phosphonic acid.
21. Method according to claims (19) and (20), whereas the complex-forming agent can be added at ever step before step (b).
22. Method according to claims (1) to (21), whereas the method comprises the following steps parallel to one, several or all preceding steps:
 - (i) separate collection of the partial streams grey water, or one or more of the partial streams thereof and black water or brown water and yellow water, and

- (ii) membrane filtration of the separate in (i) collected grey water, or one, or several partial steams thereof.
23. Method according to claims (1) to (22), whereas the method comprises the following steps parallel to one, several or all preceding steps:
- (iii) removal of carbon of the separate in (i) collected grey water, or one, or several partial steams thereof before or after (ii).
24. Method according to claims (10) to (17), comprising the following steps:
- (a) drainage of an aqueous liquid fro a storage tank, and
 - (b) usage of this liquid for toilet flushing, which can comprise the collection of faeces and urine, and
 - (c) treatment of this liquid, and
 - (d) feeding this liquid into said storage tank, and
 - (e) UVC treatment of this liquid in said storage tank, and
 - (f) repeating steps (a) to (e) one or more times.
25. Method according to one of the claims (4) to (17), comprising the following steps:
- (a) drainage of an aqueous liquid from a storage tank, and
 - (b) treatment of this liquid, and
 - (c) usage of this liquid for toilet flushing, which can comprise the collection of faeces and urine, and
 - (d) treatment of this liquid, and
 - (e) feeding this liquid into said storage tank, and
 - (f) increase of the pH value in said storage tank, or in a tank parallel to the storage tank, and
 - (g) Repeating steps (a) to (f) one or more times
26. Device for treatment and loop-processing of waste waters comprising the means as follows:
- (a) a means for the separate collection of the partial streams black water or brown water and yellow water, and

- (b) a means for the desalination of a part or total parts of at least one of the separated collected partial streams of (a), and
 - (c) a means for the use of the desalinated liquid phase of (b) to
 - (c.i) collection of black water or brown water and/or yellow water in (a), or
 - (c.ii) other uses, and
 - (d) a means for the repetition of the steps (a) to (c) one or more times.
27. Device according to claim 26), whereas the desalination means (b) comprises an means for ureolysis.
28. Device according to claims 26) and 27), whereas the means for desalination in (b) comprises the following means:
 - (b.a) a means for the ureolysis, and
 - (b.b) a means for the removal of the nutrient salts.
29. Device according to claims 26) and 28), whereas the means for desalination according to claim 26), (b), as well as the means for removal of nutrient salts of claim 28), (b) is a means for struvite precipitation.
30. Device according to claims 26) to 29), whereas after the means for desalination in (b) the comprise the following means:
 - (c) a means for the second desalination
31. Device according to claim 30), whereas the means for the second desalination comprises a means for the removal of the univalent inorganic salts.
32. Device according to claims 26) to 31), which before means (b) comprises the following means:
 - (a.i) a means for the liquid/solids separation of at least one of the separate collected partial streams obtained in (a)
33. Device according to claims 26) to 32), which comprises after means (b) the

following means:

- (b.i) a means for the oxidation of at least one of in (b) obtained low-salt phases from separate collected black water and/or brown water.
34. Device according to claim 33), which comprises after means (b.i) the following means:
- (b.ii) a means for the liquid/solids separation of at least one of the products of (b.i) of separate collected black water and/or brown water
35. Device according to claim 34), which comprises after means (b.ii) the following means:
- (b.iii) a means for the UV-Oxidation of the liquid phase of at least one of the products of (b.ii) from separate collected black water and/or brown water
36. Device according to claims (26) to (35), whereas means (b) is a means for ultra or nano filtration.
37. Device according to claims (26) to (36) whereas between means (b.a) and (b.b) a means for metered addition of substances in solid or liquid form.
38. Device according to claim (37), whereas the means for metered addition comprises the alkali KOH, and/or the substances $Mg(CH_3COO)_2$ and/or $Mg(COO)_2$ and/or potassium phosphate compounds with, and/or without hydrogen.
39. Device according to claim (38), whereas the means for metered addition is proceeded with stoichiometric amounts being adapted to the concentrations of ammonium within the liquid to be treated.
40. Device according to claims (38) and (39), whereas the metered addition of substances is proceeded according to that amount of ammonium, which is necessary, to render the equalisation of the pH decrease, caused by the transformation of ammonium to nitrate, in the oxidation of step (b.i) possible, which neutralises the basic milieu of the discharge of step (b).

41. Device according to claims (30) to (40), whereas the means for desalination in step (c) is a means for reverse osmosis.
42. Device according to claims (26) to (44), whereas the means (b) and (c) comprise one holding tank, or in two hydraulically not separated holding tanks.
43. Device according to one of the claims (35) to (45), whereas means (b.iii) is a means for activated carbon adsorption and/or ozonisation and/or UV treatment.
44. Device according to claim (26), whereas the means for desalination in (b) is a means for complexation of bivalent ions with a complex-forming agent.
45. Device according to claim (44), whereas the means comprises the complex-forming agent is amino phosphonic acid.
46. Device according to claims (44) and (45), whereas the complex-forming agent can be added with a means for metered addition at ever step before means (b).
47. Device according to claims (26) to (46), whereas the means comprises the following means parallel to one, several or all preceding means:
 - (i) a means for the separate collection of the partial streams grey water, or one or more of the partial streams thereof and black water or brown water and yellow water, and
 - (ii) a means for the membrane filtration of the separate in (i) collected grey water, or one, or several partial steams thereof.
48. Device according to claims (26) to (47), whereas the means comprises the following means parallel to one, several or all preceding means:
 - (iii) a means for the removal of carbon of the separate in (i) collected grey water, or one, or several partial steams thereof before or after (ii).

49. Device according to claims (35) to (48), comprising the following means:

- (a) a means for the drainage of an aqueous liquid from a storage tank, and
- (b) a means for the usage of this liquid for toilet flushing, which can comprise the collection of faeces and urine, and
- (c) a means for the treatment of this liquid, and
- (d) a means for the feeding this liquid into the storage tank, and
- (e) a means for the UVC treatment of this liquid in the storage tank, and
- (f) a means for the repeating steps (a) to (e) one or more times

50. Device according to one of the claims (28) to (49), comprising the following means:

- (a) a means for the drainage of an aqueous liquid from a storage tank, and
- (b) a means for the treatment of this liquid, and
- (c) a means for the usage of this liquid for toilet flushing, which can comprise the collection of faeces and urine, and
- (d) a means for the treatment of this liquid, and
- (e) a means for the feeding this liquid into the storage tank, and
- (f) a means for the increase of the pH value in the storage tank, or in a tank parallel to the storage tank, and
- (g) a means for the Repeating steps (a) to (f) one or more times